

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: SOMERVILLE, Robin B.; FAN, Liang-Tseng

SERIAL NO.: 10/089,896

ART UNIT: 1764

FILED: July 16, 2002

EXAMINER: Johnson, J.D.

TITLE: PROCESS FOR MODIFYING COAL SO AS TO REDUCE SULFUR EMISSIONS

Second Supplemental Amendment B: REMARKS

Applicant respectfully submits the present Second Supplemental Amendment "B" in a revised format in response to the Notice of Non-Compliant Amendment of March 7, 2005. The Examiner indicated that the format of the Amendment should comply with 37 C.F.R. § 1.121. Applicant respectfully contends that the present amendment is now in compliance with the required amendment practice, including a separate page for the remarks. This new format of Second Supplemental Amendment "B" is now in the proper condition for consideration. Furthermore, the present supplemental amendment has been filed before expiration of the shortened statutory period for response such that a fee for extension of time is not currently due.

Applicant notes that a response to a previous Notice of Non-Compliant Amendment was received in the U.S. Patent and Trademark Office on February 14, 2005. The present response is a reply to the latest Notice of March 7, 2005.

Upon entry of the present amendments, previous Claims 21 - 39 have canceled and new Claims 40 - 58 substituted therefor. Reconsideration of the rejections, in light of the foregoing amendments and present remarks, is respectfully requested. The present amendments have been entered for the purpose more clearly distinguishing the present invention from the prior art.

In the Official Action, it was indicated that Claims 21 - 39 were rejected under 35 U.S.C. §

103(a) as being obvious over the Smith patent.

So as to distinguish the present invention from the prior art, Applicant has revised the language of independent Claims 40 and 53 so as to more clearly define the nature of the present invention. In particular, new independent Claim 40 indicates that the step of “blending” is now “agglomerating” the coad powder with the fresh hydrated lime “in an enclosed vessel”. The agglomeration has water added thereto also “in the enclosed vessel”. Subsequent to the step of “drying”, the agglomeration is “immediately injected” into a combustion chamber. As a result of the method of independent Claim 40, the coad product is utilized without being exposed to carbon dioxide. As a result, the present invention experiences reduced sulfur emissions.

Independent Claim 53 emphasizes that the fresh hydrated lime is “unexposed to carbon dioxide and is free of binder materials other than the fresh hydrated lime”. The water, the coal powder and the fresh hydrated lime are mixed “in an enclosed container”. It is also indicated that the steps of grinding, agglomerating and adding water are in a “continuous process”. Applicant respectfully contends that these features of independent Claims 40 and 53 are neither shown nor suggested in the prior art Smith patent.

In the Official Action, it was indicated that Smith teaches the addition of calcium hydroxide - - not calcium carbonate - - and it is well known that calcium hydroxide absorbs carbon dioxide from the atmosphere to form calcium carbonate. As such, the Examiner indicates that one having ordinary skill in the art would be motivated to use calcium hydroxide as taught by Smith, i.e., “fresh” calcium hydroxide not containing significant calcium carbonate. Additionally, it was indicated that the previous claims did not “exclude the binders of Smith”. Applicant respectfully contends that the use of the fresh hydrated lime, as defined by the present claims, achieves the advantages of the

present invention. This was recited in the previous amendment referencing the original specification paragraph [0021]. In the present invention, the modified coal is prepared by agglomerating the finally divided coal with the fresh hydrated lime powder “onsite” in enclosed vessels, immediately prior to injection into the combustion chambers. This minimizes the exposure of the fresh hydrated lime powder to carbon dioxide in the atmosphere. The potential danger of dust explosions is minimized. Since the resultant product of the present invention is immediately injected in the combustion chamber, no storage space is required.

In the Smith patent, it is roughly indicated that, as the Examiner says, calcium hydroxide is added to the coal particles. However, the Smith patent does not suggest the use of “fresh” calcium hydroxide. In fact, the Smith patent teaches away from the use of “fresh” calcium hydroxide since the product of the Smith patent is intended for shipment, transportation and storage. As a result, the use of such “fresh” hydrated lime would be rather fruitless in the overall process of the Smith patent. As was stated in column 5, lines 17 - 28, of the Smith patent:

Therefore, in the preferred embodiments of this invention, the admixture will be formed into pellets, briquettes or other larger particles to allow the admixture to be safely and efficiently handled, shipped, stored and used in conventional equipment. The admixture of inorganic material with the coal or lignite can be agglomerated or pelletized to produce a product which can be safely handled, shipped, or stored, without appreciable dust loss and can be supplied to conventional combustion apparatus with conventional equipment normally used for handling and stoking coal or lignite in large pieces.

As such, it can be seen that the purpose of the Smith patent is to provide a coal product that can be conveniently shipped. If “fresh” calcium hydroxide were used, then continued exposure of carbon dioxide in the atmosphere would occur during such processes of shipment, transportation and storage. As a result, the extra expense and handling and convenience of “fresh” hydrated lime

would not be contemplated within the Smith patent. The fact that the “fresh” hydrated lime was not contemplated in the Smith was further evidenced by the recitation found in column 4, lines 31 - 51, of the Smith patent as follows:

The pulverized coal or lignite and the finely divided inorganic materials can be intimately admixed together by any suitable means. It is important, however, than an intimate admixture be formed whereby the inorganic material is completely dispersed throughout a mass of the pulverized coal or lignite. Therefore, tumblers, ribbon mills and the like can be utilized to form the intimate admixture. As previously mentioned, a solution of the inorganic material is very beneficial for thoroughly dispersing the inorganic material throughout the mesh of the pulverized coal or lignite. In such instances, the solution of the inorganic material can be conveniently sprayed on the surface of the coal or lignite and the solvent can be removed by evaporation. Another suitable method for applying the inorganic material to the coal or lignite is by forming a slurry of the finely divided inorganic material in a suitable carrier such as water and the like, and thereafter, spraying the slurry on the surface of the coal or lignite while tumbling or shaking the coal to insure a complete dispersion of the slurry throughout the mesh of the coal or lignite.

Since the process of the Smith patent contemplates such spraying, tumblers, or ribbon mills, it is unlikely that such a mixture can be carried out without exposure to carbon dioxide. Quite clearly, the process of the Smith patent is not carried out in “enclosed” containers. As a result, the use of “fresh” hydrated lime would not be contemplated by the Smith patent, nor obvious in view of the Smith patent, since contamination with carbon dioxide would inherently result from such “spraying” operations or with the mixing in “tumblers” or “ribbon mills”. There is no suggestion or teaching within the Smith patent that it is desirable, in any way, to avoid exposure to atmosphere. The exposure to atmosphere is inherent through the process of transportation, shipment and storage of the product of the Smith patent. On this basis, Applicant respectfully contends that the use of “fresh” hydrated lime would not be “obvious” in view of the Smith patent, even though the Smith

patent does suggest the use of calcium hydroxide.

Specifically, with respect to the new claims, Applicant notes that the Smith patent processes the material so that the materials can be stored, transported and shipped. In contrast, independent Claim 40 recites that the dried agglomeration is “immediately injected” into a combustion chamber.

As a result, the present invention achieves the advantage of minimizing the potential of dust explosions. This also minimizes any potential for the exposure of the fresh hydrated lime powder to carbon dioxide in the atmosphere. The present invention further avoids the costs of transportation, shipment and storage by the “immediate injection” into a combustion chamber. As a result, the present invention achieves the useful advantage of reduced sulfur emissions.

Dependent Claim 43 has been amended so as to indicate that the fresh hydrated lime is of a particle form and “without binders added thereto”. As such, the present invention specifies the lime as the binder material and avoids the use of any binders which will tend to contain some sulfur. Since typical binders, such as those suggested in the Smith patent, are far more costly and difficult to handle, as well as more expensive to supply and apply than the binder of the present invention, the present invention achieves advantages over the prior art solely through the use of the fresh hydrated lime in and of itself.

Dependent Claim 48 recites that the agglomeration from the enclosed vessel is passed to an externally heated oven “without exposing the water-added agglomeration to carbon dioxide”. Such a step is neither shown nor suggested in the Smith patent

Independent Claim 53 is further distinguishable from the prior art by indicating that the fresh hydrated lime is “unexposed to carbon dioxide and is free of binders of materials other than the fresh hydrated lime”. Independent Claim 53 further distinguishes itself from the various spraying,

tumbling, or ribbon mill processes of the Smith patent by indicating that the mixture occurs "in an enclosed container". Additionally and furthermore, the steps recited in independent Claim 53 are all indicated as being as part of a "continuous process". Applicant respectfully contends that these are neither shown nor suggested in the prior art Smith patent.

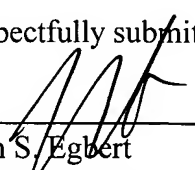
Applicant repeats its recitations from previous Amendment "A" by reference thereto. Quite clearly, the processes the present invention are simpler than those of the Smith patent and avoid the expensive processing of materials associated with the Smith patent. The use of fresh hydrated lime is clearly distinguishable from the mere "calcium hydroxide" recited in the Smith patent. ✓

The dependent claims herein have been changed so as to reflect their dependencies from the new independent claims. Specifically, dependent Claims 41 - 52 correspond, respectively, to previous dependent Claims 22 - 33. New dependent Claims 54 - 58 correspond, respectively, to the limitations of previous dependent Claims 54 - 58.

Based upon the foregoing analysis, Applicant contends that independent Claims 40 and 53 are now in proper condition for allowance. Additionally, those claims which are dependent upon these independent claims should also be in a proper condition for allowance. Reconsideration of the rejections and allowance of the present claims at an early date is earnestly solicited. Since no new claims have been added above those originally paid for, no additional fee is required.

3-14-05
Date

Respectfully submitted,



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CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

I hereby certify that the attached correspondence comprising:

Second Supplemental AMENDMENT "B"

is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

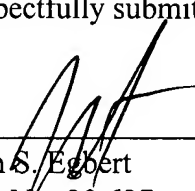
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